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METHODS OF IMPROVING THE QUALITY OF LOW GRADE EGYPTIAN COTTON PRODUCTS, THROUGH IMPROVED METHODS OF PROCESSING

By I. A. H. SHAHIN, M. Sc.,
Alexandria Spinning,
Weaving and Dyeing Co.,

and E. A. R. HIGAZI, Ph. D.,
Misr El Beida Dyers

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METHODS OF IMPROVING THE QUALITY OF LOW GRADE EGYPTIAN COTTON PRODUCTS, THROUGH IMPROVED METHODS OF PROCESSING

I.A.H. Shahin, M.Sc.
Alexandria Spinning, Weaving & Dyeing Co.,

E.A.R. Higazi, Ph.D.
Misr El Beida Dyers

Introduction

1. Lower grades of Egyptian Cotton varieties as designated in this paper are largely locally consumed. The economic importance of these cottons is obvious since they represent about 12% of the total cotton production, which will affect directly the income of the farmers and to some extent the total national income.

2. Technological advances, research work and organized State control in the field of cotton growing are carried out with the aim of:

(a) improving seed selection and supply

(b) improving the existing varieties and replacing the degenerated strains by others of better physical characteristics and of higher yields

(c) improving agricultural, picking, ginning and handling methods

(d) enforcing the fighting campaign against disease and insect pests to protect the crop on one hand and to raise its average grade on the other

3. These efforts have led not only to maintaining the famous characteristic of the Egyptian cotton but also to increasing the average grade of the crop thus decreasing the amount of low grade cottons from year to year.

4. The lower cotton grades are as stated before locally consumed in producing fabrics cheap enough to be within the buying power of the lower income groups of the population. The quality of these fabrics however has been much improved through improved methods of processing in the various spinning, weaving preparation, weaving and finishing operations. The fabrics thus produced are better in appearance and handle, more attractive and readily saleable.

STATISTICAL DATA OF THE LOW GRADES EGYPTIAN COTTON VARIETIES

5. Table I gives particulers of the Egyptian cotton production data, over the period from 1954/55 to 1961/62, for the various staple lengths, and, is classifieid under 2 main groups:

(a) lower side of the grade scale which starts from Fair (F) to Fully Good Fair/Good (FGF/G) inclusive.

(b) higher side of the grade scale which starts from Fully Good Fair/Good (FGF/G) to Extra (E) inclusive.

6. Study of Table I will readily show that the percentage of the F to FGF/G group is highest for medium staple varieties ranging from 9% to 16% with an average of 12.6%, while for the long staple varieties the percentage is lowest ranging from 2% to 6% and averaging 4%. The corresponding percentage range for the long-medium staple varieties is from 3.6% to 16% with an average of 8.8%. The table also shows that the below grades group namely, mixed, low mixed and scarto represent about 3.9% of the total production. The low grades of Egyptian cotton will include the F to FGF/G group and the below grades group having a range from 8% to 16% and averaging 11.7% or the equivalent of 45000 tons/Annum.

7. Table II, gives particulars of the local cotton consumption classified in the same manner as Table I, over the period from 1955/56 to 1960/61.

8. Reference to Table III shows that the bulk of the low grades is consumed locally. The importance of these statistics is obvious since the substantial amount of 45000 tons of low grade cottons will roughly make up for about 30% of the total present local cotton consumption.

9. Several Egyptian Textile Mills, working for home trade, have been able to handle these cottons successfully to produce rural quality fabrics through the adoption of the contemporary technological advances in the fields of spinning, weaving, and finishing processes.

SURVEY OF PRACTICE ADOPTED BY SOME TEXTILE MILLS IN PROCESSING LOW GRADE EGYPTIAN COTTONS

Spinning and Weaving.

10. The quality of the fibres of the low grades is characterized by the high percentage of short, immature and dead fibres; the tendency to be on the coarser side of the fineness scale and the higher proportion of impurity contents. To deal with such fibre characteristics in the spinning processes, the following procedures should be carried out:

(a) Because of the lack of resiliency of immature and dead fibres, in addition to the higher impurities contents, careful handling, efficient opening and cleaning in the blowing room machinery would be a necessity, otherwise neppiness and

appreciable fibre-entanglement would result and yarn appearance and uniformity will be deteriorated.

(b) Careful handling of the material will also be necessary on the carding machines and special procedures should be adopted to give better carding conditions to the effect of minimizing nep count and having a carded sliver with better fibre isolation.

(c) Under normal working conditions, the nep count and degree of fibre isolation in carded slivers produced from low grade cottons, are appreciably inferior to slivers produced from the higher grades. This creates difficulties in drafting and the product would inevitably be irregular. These difficulties could be partially overcome by the utilization of efficient drafting systems on drawing, speed and ring frames.

11. The current practice of processing the low grade cottons in some of the UAR Textile Mills may be surveyed in the following:

(a) In the blowing room the following arrangement was found satisfactory:

(i) Any modern line of blowing room machinery with about five major cleaning points, would be able to satisfy the present requirements if suitably adjusted and modified. Speeds and settings of all spiked lattices in hopper feeders and hopper openers should be adjusted to minimize idle time, hence ensuring more efficient opening. Suitable combinations of porcupine, kirschner and saw-teeth type beaters is used in preference to severe action beaters such as bladed beaters.

(ii) For medium and long-medium staple varieties, a crighton opener is generally used, and its position in the line should be directly after the bale openers. For long staple varieties, this type of opener is generally by-passed.

(iii) Strict blending procedure is planned and adopted to ensure the homogeniety of the material from day to day during the season.

(iv) Lighter scutcher laps in the order of 400 gr/m, would be more satisfactory.

(b) For the carding process, the following arrangement is generally adopted:

(i) Raising the taker-in speed up to 650 r.p.m. and slowing the doffer speed down to about 5 rpm at a production rate of about 4 Kg/card/hr.

(ii) Normal carding machines' settings are maintained, except: the setting between the taker-in and mote-knives should be closer, the settings of the front and back sheets should be appropriately accessed to minimize the nep count.

(iii) Metallic card clothing is preferable or else, the ordinary flexible foundation card clothing could be used successfully if the carding machine is fitted with a continuous stripping device. This procedure was found to give a fairly good carding condition. The nep count in the resulting card slivers did not exceed much that of the scutcher laps. The doffer web appearance was, also improved due to an improvement of web cloudiness.

12. As already mentioned, the draftability of the resulting card sliver suffers from the lesser degree of fibre to fibre isolation and from the higher nep count. This necessitates efficient drafting systems on drawing, speed and ring frames. The following drafting systems proved to be satisfactory: 3 over 4 drafting on the drawing frames, 3 over 4 or MS-2 Platts type of drafting on speed frames and double apron drafting system on the ring frames.

13. The yarn count normally spun from the low grades ranges from 10's to 30's (English count) with an average of 16's. Naturally, the quality of yarn produced depends in the first place on the type of blends utilized. But, generally the quality is inferior; in appearance, cleanliness and strength in comparison with the standard qualities spun from the higher grades of Ashmouni. The yarn strength is lower by about 10% to 20%, while the yarn appearance varies from grade C to grade D of the ASTM standards.

14. In order to maintain the efficiency of modern high speed automatic looms to a rational level, prime consideration should be given to yarn clearing and warp preparation, especially sizing.

15. The quality of the produced grey fabrics, although substantially improved, yet is inferior in appearance, cleanliness and handle. The finishing processes in their widest applications play an important rôle in raising the quality, enhancing the appearance and handle of the cloth, thus rendering it more attractive and readily saleable.

Finishing.

16. In general terms, the main finishing processes includes: scouring and bleaching, mercerising, dyeing, printing and dressing or finishing proper. The relative importance of these various finishing operations and how to get the maximum benefit of each process, if applied to the low grade cotton fabrics may be given in the following:

(a) Bleaching: May be considered as the basic operation in textile finishing processes and on its efficiency depends, the success of all subsequent operations. Low grade cotton fabrics, naturally contain higher percentage of sizing material, more impurities such as seed-particles, trashes and the like, and are of more hairy texture.

This class of fabrics should be given careful consideration with regard to brushing and shearing, to remove by mechanical means the most part of impurities, knots and hanging threads.

(i) The cleaning machine should be equipped by both, emery and bristle or nylon-brush rollers. For higher production rates, modern shearing machines are used.

(ii) Sigeing follows to clear the surface fibres and fuzzes, and this process is performed on either, gas or plate singeing machines. Uniformity of gas flames across the width of the fabric, is essential, or else, irregularities in the degree of dyestuff absorption would result, thus leading to unlevel-dyeing.

(iii) For the removal of the sizing materials previously applied to the threads during the warp preparation, an efficient disizing operation is imperative for the success of the subsequent bleaching and dyeing processes as insufficient desizing would lead to bad penetration of dyestuffs and unlevel-dyeing. In case, a water soluble size is used, such as soluble starch, carroub gum, alginate or c.m.c., washing with hot or lukewarm water would be sufficient to remove the sizing material. In case non-soluble starches were used, enzymes such as diastase or bactolase are essential.

(iv) For low grade cotton fabrics, where higher impurity contents are present, a good scouring operation would be necessary. Scouring is best done in pressure circulating kiers, with the addition of 3% caustic soda (by total weight of cloth). The addition of sodium silicate is beneficial, in case of dirty cloth, as it helps to keep in suspension the dirt particles removed from the cloth by scouring. The addition of surface active products, is recommended when the cloth contains oily stains; the best result may be obtained by the use of mixture of an ionic and non-ionic surface active agents.

(v) With a scouring procedure as outlined, bleaching would be an easy operation and is generally performed, either by the use of hypochlorite or peroxide of hydrogen. The latter gives a better permanent white but is more expensive. In case the cloth is to be treated with resin, a hydrogen peroxide bleaching is recommended, because, yellowing of fabric during curing is thus prevented.

(b) Mercerising: Generally, mercerisation is not practiced on low grade cotton fabrics with the purpose of obtaining lustre as the result does not give a satisfactory account for the process expenses. But, a semi-mercerisation is oftenly used for manifold purposes:

(i) increasing dyestuffs absorption in dyeing and printing, due to the activation of cotton cellulose.

(ii) removing rope creases in cloth, when bleaching is carried out in rope - form, espcailly with crowded

construction fabrics, in which case creases tend to be permanent and show clearly after dyeing.

(iii) reducing the bad response of dead fibres to dyeing and thus leading to more levelled dye shades.

(iv) increasing the tensile strength and elasticity of cloth, thus leading to better wearability.

On the whole, mercerisation enhances the all-round properties of the fabrics and makes them look richer. Mercerisation may be performed on either the grey or bleached goods. In the first case, better results are obtained if the cloth is desized and with the addition of a penetrant to assist the absorption of caustic soda.

(b) Dyeing: Contrary to the common belief, low grade fabrics, should be dyed with dyes of fairly good fastness to both washing and light, as such fabrics would be subjected in their intended uses, to longer rate of wearability, more repeated washing and more exposure to sunlight. For this purpose, the most appropriate group of dyestuff, is the insoluble azo dyes, commonly known as the naphtol colours. This dye group acquires besides their fastness a high degree of brilliancy.

17. Another recommended group of dyestuffs, would be the fast to light direct colours and the after treated direct colours. Both groups give a fairly good fastness to both light and washing.

18. Sulphur dyes may be used with satisfaction for most of the dark shades, such as: olives, khakies, browns, navy and blacks. Almost all sulphur dyes are of good fastness to washing and to light.

19. Aniline black presents one of the fastest black colours, and is in the same time, cheap in cost price. Although its use reduces the tearing strength of the cloth, yet, it is the most widely used black.

20. The resistivity of immature and dead fibres to the absorption of dyestuffs represents a major difficulty, encountered in dyeing. Semi-mercerisation as already mentioned, would help to a certain extent in solving the problem. The rest depends on the appropriate selection of the group of dyestuffs to be utilized. Most of dyestuff manufacturers give a selection of dyes which are most suitable for this purpose.

(d) Printing: Printing process, by its nature, tends to cover almost entirely, the imperfections in the cloth texture, and thus, it is considered to be the most appropriate process for low grade cotton fabrics. To this effect, rural qualities are generally printed in patterns which cover most of the surface of the cloth, thus concealing the above mentioned defective texture.

21. The most suitable group of dyestuffs is the naphtol, Vat dyestuffs are utilized for less covered surfaces, such in case of stripped patterns for pyjamas and shirting material.

22. Pigments are also used for this class of fabrics, to give brilliancy effects. They are easy to apply and have a good cover, but unfortunately, the prints obtained, generally suffer from low rubbing fastness, and where hand washing is used, the utilization of pigments is not recommended.

23. Reactive dyes are rather expensive to apply in this case, but they are utilised in some cases, where a great degree of brilliancy is called for together with good fastness.

(e) Finishing and dressing: The finishing proper is a designation given to all mechanical, physical and chemical processes, which are applied to the fabrics, in order to endow them with special properties, either temporary or permanent with the purpose of enhancing the final handle and appearance.

24. Among the various effects obtained from the finishing processes, the following are considered, representing the common practice:

(i) Filling: The filling material, commonly used is starch and dextrine, glue is also added in small amounts to increase stiffness. This type of finish is not permanent, and usually disappears after one or two washings. If a permanent finish is required as in the case of jupons and collar-linings, synthetic resin should be used, either alone or in combination with starch.

(ii) Softening: In case of a soft finish is required, softeners such as: turkey red oil, or synthetic softeners are added to the dressing composition.

(iii) Optical Whitening: Agents are often added to the dressing composition, to increase the degree of whiteness for white goods or printed goods with white grounds.

(iv) Lustering: High gloss is obtained by friction calenders. Medium lustre is obtained by normal calendering; while subdued lustre is performed by Schreiner calenders, which are usually applied to sateens and drills. A special calendering effect, known as chasing, is utilized to enhance the cover of low grade cotton fabrics and render them fuller in handle. This is effected by passing several layers of the cloth, one upon another between the rollers of the calender.

(v) Raising: Is one of the most important and successful finishes that could be applied to low grade fabrics, the advantage being that raising conceals almost entirely the inperfection of fabric texture. Raised cloth is very popular in UAR during winter time, thus representing a big field of utilization.

(vi) Surface coating: Apart from clothing purposes, low grade cotton fabrics are coated with starches as in the case of book-binding; or with synthetic resins, specially polyvinyl-

chloride or acrylic resins to produce synthetic leather which has manifold applications in industry and household utilities.

(vii) Flocking: Low grade fabrics are much used nowadays, as a ground for flock, which gives an imitation of velvet, and cover at the same time, all imperfections present in ground fabrics. This type of finish is acquiring an expending field of applications such as in the production of jackets, shoes, ladies bags, lining of suitcases, wall coverings and the like.

TABLE III

ANNUAL TOTAL PRODUCTION AND LOCAL CONSUMPTIOM OF LOW-GRADES EGYPTIAN COTTONS

S E A S O N	Low-Grades up to FGF/G ⁺	
	Production	Consumption
1955 / 1956	53508	46661
56 57	41920	58163
57 58	50361	56196
58 59	53114	63180
59 60	43700	31756
60 61	38132	25386
Total	280735	281342
Average	46789	46890

⁺ Including: mixed, low mixed and scarto quantities

TABLE "I"

PRODUCTION STATISTICS OF EGYPTIAN COTTONS CLASSIFIED BY GRADES AND STAPLE LENGTHS

SEASON	LONG-STAPLE VARIETIES					LONG-MEDIUM STAPLE VARIETIES					MEDIUM-STAPLE VARIETIES					TOTAL OF ALL VARIETIES				MIXED LON MIXED & SCAKTO		GRAND TOTAL
	Up to FGF/G		FGF/F to Extra		TOTAL	up to FGF/G		over FGF/G to Extra		TOTAL	up to FGF/G		over FGF/G to Extra		TOTAL	up to FGF/G		over FGF/G to Extra				
	Tons	%	Tons	%	Tons	Tons	%	Tons	%	Tons	Tons	%	Tons	%	Tons	Tons	%	Tons	%	Tons	%	Tons
1954/1955	4777	4.22	108525	95.78	113302	7992	9.67	74641	90.33	82633	16496	12.20	118692	87.80	135188	29265	8.41	301858	86.75	16846	4.84	347969
1955/1956	7174	6.15	109446	93.85	116620	6646	11.39	51715	88.61	58361	23287	16.34	119232	83.66	142519	37107	11.11	280393	83.97	16401	4.92	333901
1956/1957	5467	4.21	124408	95.79	129875	3626	6.90	48942	93.10	52568	18083	14.20	109225	85.80	127308	27176	8.37	282575	87.08	14744	4.55	324495
1957/1958	8941	4.99	170219	95.01	179160	2657	10.04	23815	89.96	26472	23104	13.37	149708	86.63	172812	34702	8.81	343742	87.22	15659	3.97	394103
1958/1959	10973	4.28	245349	95.72	256322	569	6.62	8029	93.38	8598	25786	15.99	135502	84.01	161288	37328	8.44	388880	87.98	15786	3.58	441994
1959/1960	7306	3.17	223499	96.83	230805	1301	3.78	33087	96.22	34388	20867	11.84	155402	88.16	176269	29474	6.46	411988	90.41	14226	3.13	455688
1960/1961	4907	2.20	218268	97.80	223175	1732	3.60	46392	96.40	48124	17377	9.43	166861	90.57	184238	24016	5.10	431521	91.88	14116	3.02	469653
1961/1962	4574	3.36	131428	96.64	136002	6138	16.11	31957	83.89	38095	14185	8.92	144751	91.08	158936	24897	7.19	308136	89.04	13022	3.77	346055
TOTAL	54119		1331142		1385261	30661		318578		349239	159185		1099373		1258558	243965		2749093		120800		3113858
AVERAGE	6765	3.91	166393	96.09	173158	3833	8.78	39822	91.22	43655	19898	12.65	137422	87.35	157320	30496	7.83	343637	88.29	15100	3.88	389233

TABLE "II"

STATISTICS OF EGYPTIAN COTTONS LOCAL CONSUMPTION BY GRADES AND STAPLE LENGTHS

	LONG STAPLE VARIETIES					LONG MEDIUM STAPLE VARIETIES					MEDIUM STAPLE VARIETIES					TOTAL OF ALL VARIETIES				MIXED LOW MIXED & SCARTO		GRAND TOTAL
	up to FGF/G		over FGF/G to Extra		Total	up to FGF/G		over FGF/G to Extra		Total	upto FGF/G		over FGF/G to Extra		Total	up to FGF/G		Over FGF/G to Extra				
	Tons	%	Tons	%	Tons	Tons	%	Tons	%	Tons	Tons	%	Tons	%	Tons	Tons	%	Tons	%	Tons	%	Tons
1955/1956	2978	89.48	350	10.52	3328	4457	56.49	3433	43.51	7890	31116	46.39	35965	53.61	67081	38551	44.61	39748	46.00	8110	9.39	86409
1956/1957	3706	65.33	1967	34.67	5673	6946	65.68	3630	34.32	10576	35853	58.28	25663	41.72	61516	46505	52.01	31260	34.96	11658	13.03	89423
1957/1958	5087	54.83	4191	45.17	9278	2434	25.08	7270	74.92	9704	38144	57.15	28605	42.85	66749	45665	47.44	40066	41.62	10531	10.94	96262
1958/1959	8391	49.28	8636	50.72	17027	1635	38.43	2619	61.57	4254	45745	61.51	28619	38.49	74364	55771	54.12	39874	38.69	7409	7.19	103054
1959/1960	4075	23.53	13245	76.47	17320	387	14.84	2220	85.16	2607	22060	27.20	59035	72.80	81095	26522	24.96	74500	70.11	5234	4.93	106256
1960/1961	1963	14.75	11348	85.25	13311	1328	21.37	4887	78.63	6215	15710	16.75	78092	83.25	93802	19001	15.87	94327	78.79	6385	5.34	119713
TOTAL	26200		39737		65937	17187		24059		41246	138628		255979		444607	232015		319775		49327		601117
AVERAGE	4367	39.74	6623	60.26	10990	2864	41.66	4010	58.34	6874	31438	42.43	42663	57.57	74101	38669	38.60	53296	53.20	8221	8.20	100186

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